

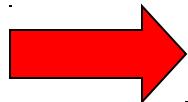


FORT FUTURE Tools: Sustainable Installation Modeling

STO # IV.EN.2002.02

Dr. Michael Case - Special Project Officer

Outline



- Introduction
- Requirements
- Scope Overview
- System Design
- Facility Composer
- Prototypes
- Schedule

What is Fort Future?

Fort Future is a decision support and planning framework that helps users to evaluate and compare proposed planning alternatives using modeling and simulation

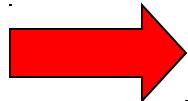
Fort Future is:

- Web-based
- Collaborative
- A Sustainable Installation Planning Tool
- Extensible (plug-ins)

Product

- Inputs
 - Human judgment
 - GIS
 - STAMIS (IFS, ISR, RPLANS, etc)
- Outputs
 - Analysis Documents
 - Visualizations
 - Planning documents

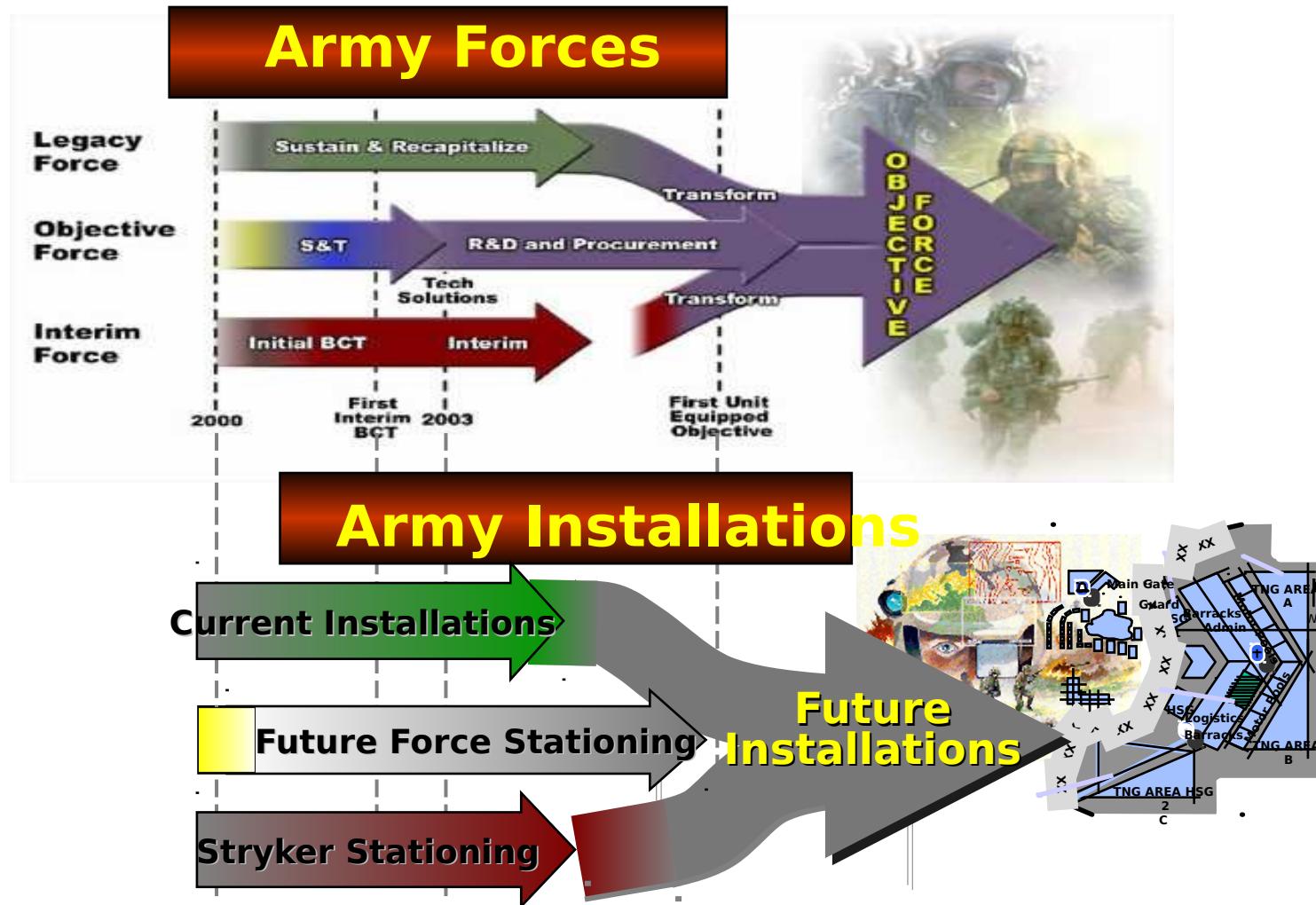
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Transformation Campaign Plan: LO12

Environmental Quality and Installations



"One ERDC....Providing Technologies for the Transformed Army"

New Complex Installation Requirements...



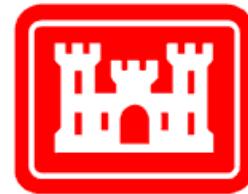
- Equipping
- Stationing
- Fielding

- Power Projection Platforms upgraded transportation systems
- Combat Preparation and Sustainment Bases sustainable training
- Secure Sanctuaries passive and active systems
- Information Hubs new infrastructure
- Holistic Communities modern, pleasant installations, linkage to community

... demand complex analysis capability



TOFFLER ASSOCIATES®



Installation Transformation Wargame FY03

Executive Summary of Final Report
Bob Bivins, Tom Johnson, Steven Kenney, Richard Szafranski, Rocky
Wilkinson

August 26, 2003

**302 Harbor's Point . 40 Beach Street . Manchester, Massachusetts
01944**

**978-526-2444 . Facsimile: 978-526-2445 . Email:
tofflerassociates@toffler.com**

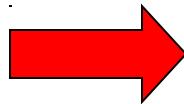
Capabilities Needed

Results from 2 ACSIM/USACE Installation Planning Wargames validate requirements for:

- Better way to link mission requirements, equipment, and infrastructure
- “Meta-planning” capability - I.e., better planning
- Ability to assess power projection capability, risk, and cost.
- Adaptable, agile, responsive planning & construction
- Better way to integrate Force Protection considerations in planning decisions
- Assured viability of Training Assets over time

**Balancing total Army needs and meeting
Transformation pace requires means of exploring
possible solutions before committing limited
resources**

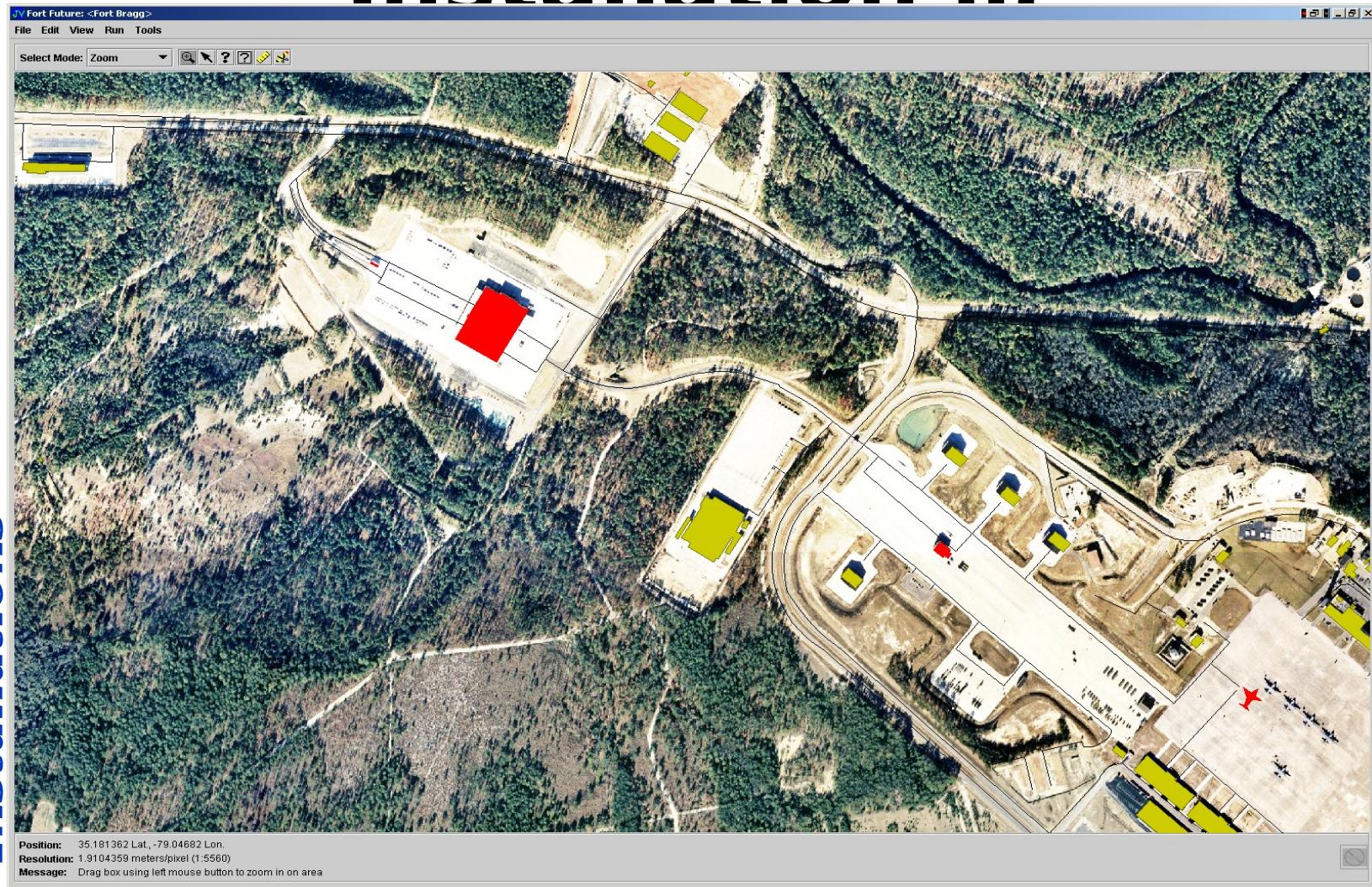
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Environmental Quality and Installations

Imagine a Virtual Installation ...



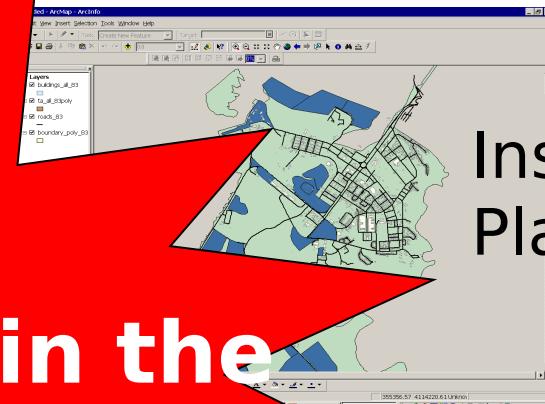
Fort Future Tools for Complex, Integrated Analysis

Power Projection Planner



Force Protection Tools

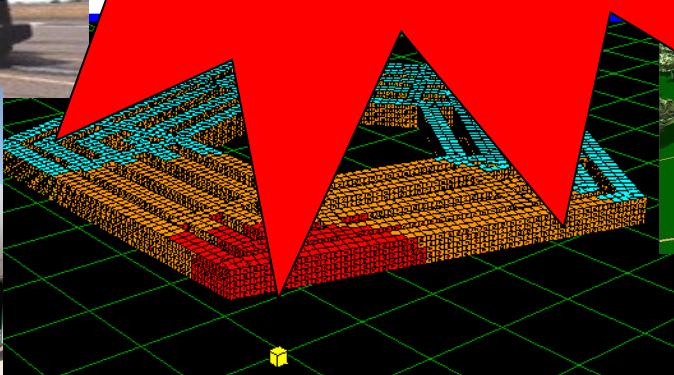
Risk and Encroachment Tools



Installation Planner



Facility Composer



"One ERDC....Providing Technologies for the Transformed Army"

Integrated Installation

- Planning tool is the **Plan integrator**
- MTEL tool captures mission requirements



- Run analyses across functional areas
- Visualize outcomes
- Responsive Master Plan generation

Requirement: Balance multiple mission needs for the long-term Plan generation

Power Projection Planner

- Model Deployment Processes
- Assess ability of infrastructure to support deployment
- Explore infrastructure option
 - Time
 - Cost
 - Risk
- Single or multiple installations



Requirement: Risk-based approach to investment

Facility Composer

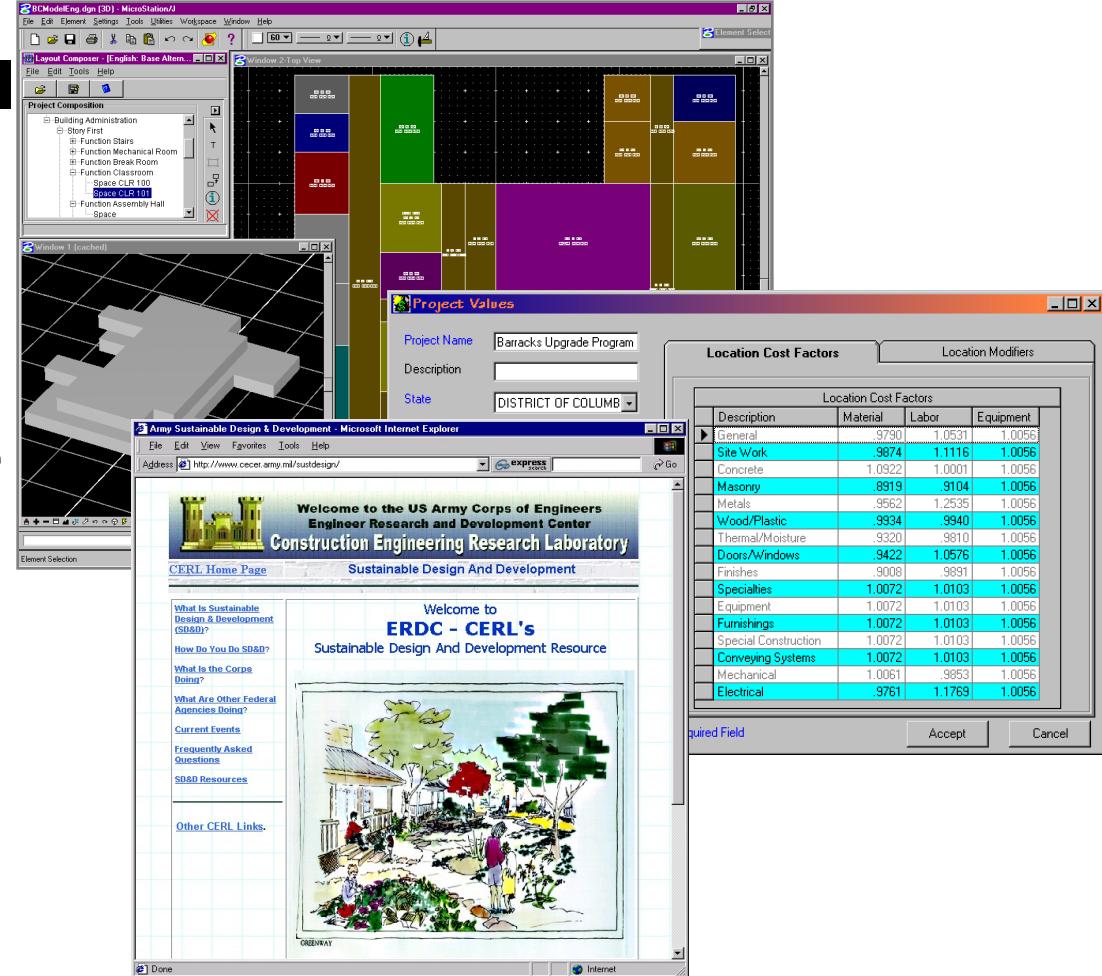
- Capture and apply

**Unit Set Fielding
criteria and
requirements**

- Rapidly estimate
design and cost

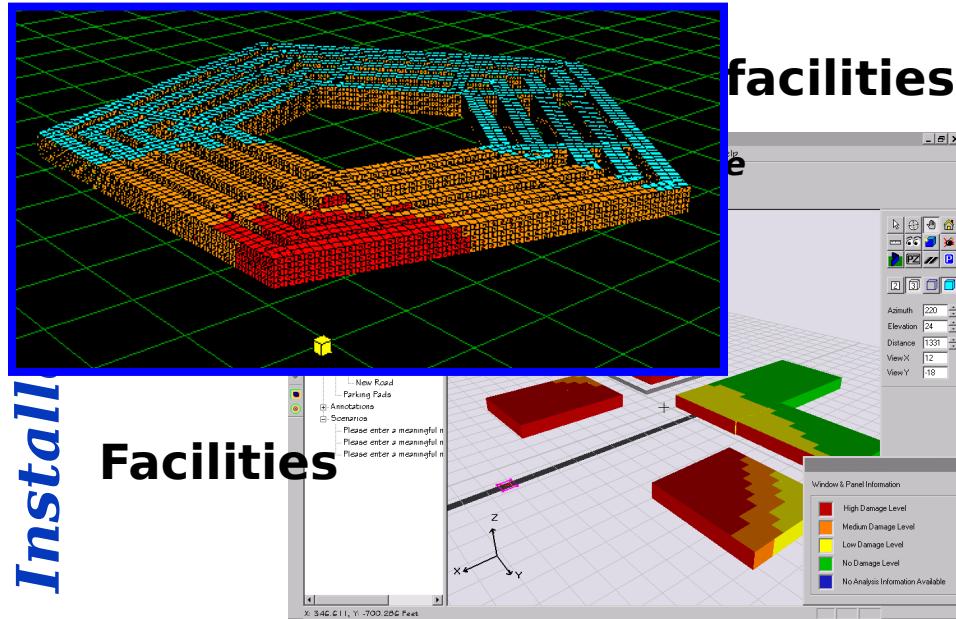
**Design
sustainable
Facilities
Incorporate
Lessons-**

learned requirement: Assure facilities ready for OF fie



Force Protection Tools

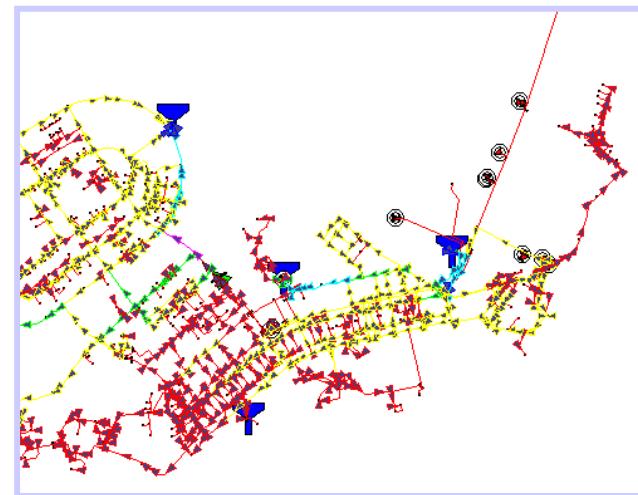
- Determine infrastructure vulnerability to blast or CBR attack
- Assess impact of attack on human life and mission



Facilities



Airborne CBR attack



Water system CBR attack

Requirement: Meet new security threats

"One ERDC....Providing Technologies for the Transformed Army"

Risk & Encroachment Tools

- National Risk Assessment
- Analyze encroachment risk
 - Frequency
 - Noise
 - Dust, smokes, & obscurants
 - Endangered species
- Detect impact on historic and cultural resources

Fort Future - SIRRA Matrix - Microsoft Internet Explorer

File Edit View Favorites Tools Help

Address http://dogba.ccer.army.mil:8080/ff/sirra.do

Back Stop Search Favorites Media Links

User Default Screenshot

Topics

Sustainable Installations Regional Resource Assessment: Army

Home Resources

Select a military branch:

Army Air Force Navy Marines Coast Guard National Guard DLA All Branches

Select one or more indicator categories:

Air Sustainability Energy Sustainability Urban Development TES Locational Sustainability
 Water Sustainability Economic Sustainability ODL Sustainability Infrastructure Sustainability Security Sustainability All Indicators

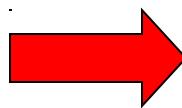
Submit Query

Installation (Army) by State	Indicators	Criteria Pollutant Non-Attainment	Noise Complaints	TES Species Listed	Ecological Resiliency	Critical Habitat	State TES % on Installation	Level of Development	Groundwater Depletion	Flood Risk	Low Flow Sensitivity	Species at Risk	Water Quality
Anniston AD (Army)	Alabama	0	-	-	-	-	-	Low	Low	Average	Low	2	2
Fort McClellan (Army)	Alabama	0	-	-	-	-	-	Low	Low	Average	Low	2	2
Fort Rucker (Army)	Alabama	0	-	1	Moderate-Low	No	0.87	Low	Low	Average	Low	1	-
Phosphate Development Works (Army)	Alabama	0	-	-	-	-	-	Average	Low	Average	Low	2	1
Redstone Arsenal (Army)	Alabama	0	-	4	High-Moderate	No	0.48	Average	Low	Average	Low	2	6
Fort Greely (Army)	Alaska	0	-	-	-	-	-	-	-	-	-	-	-



Requirement: Maximize Training Opportunities

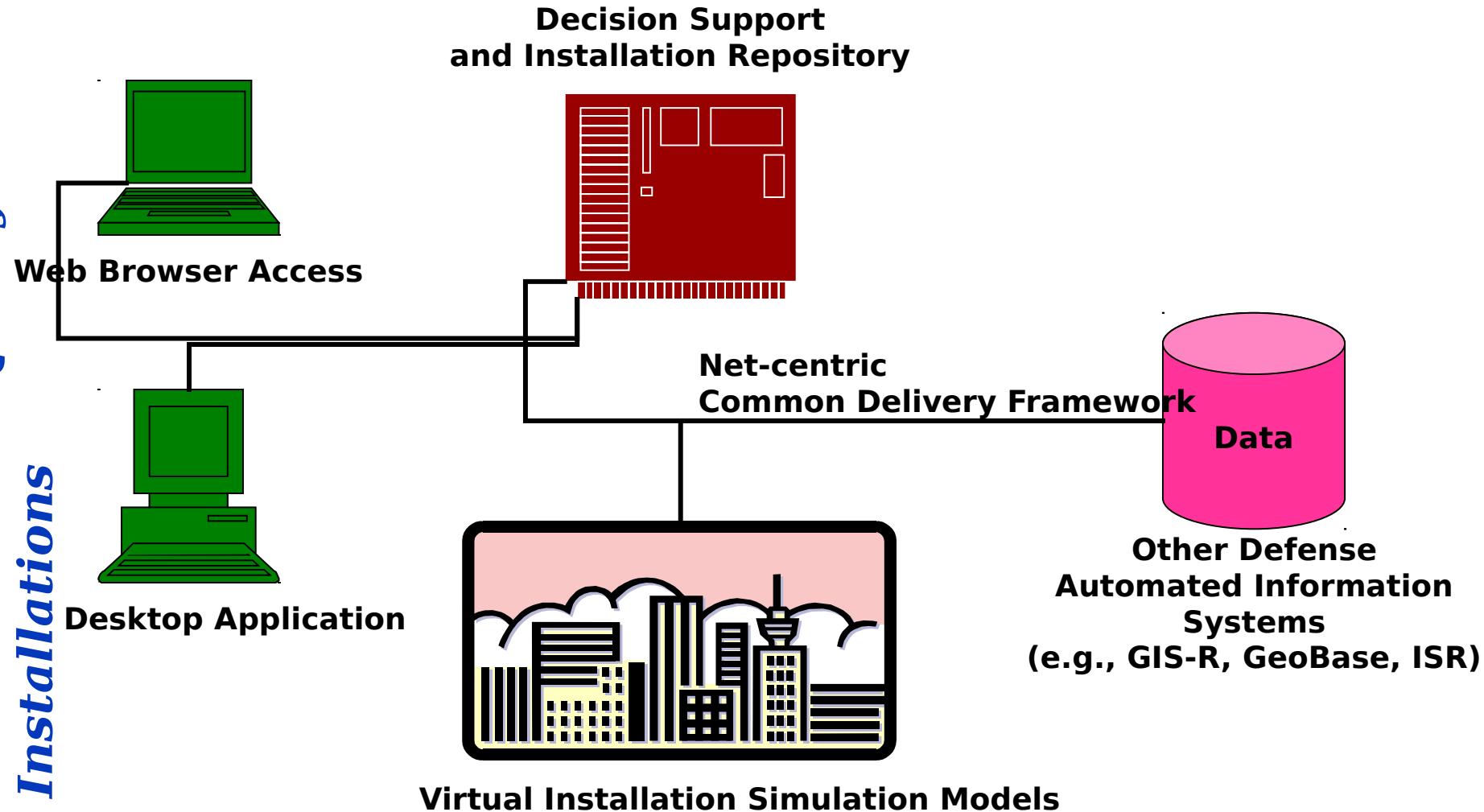
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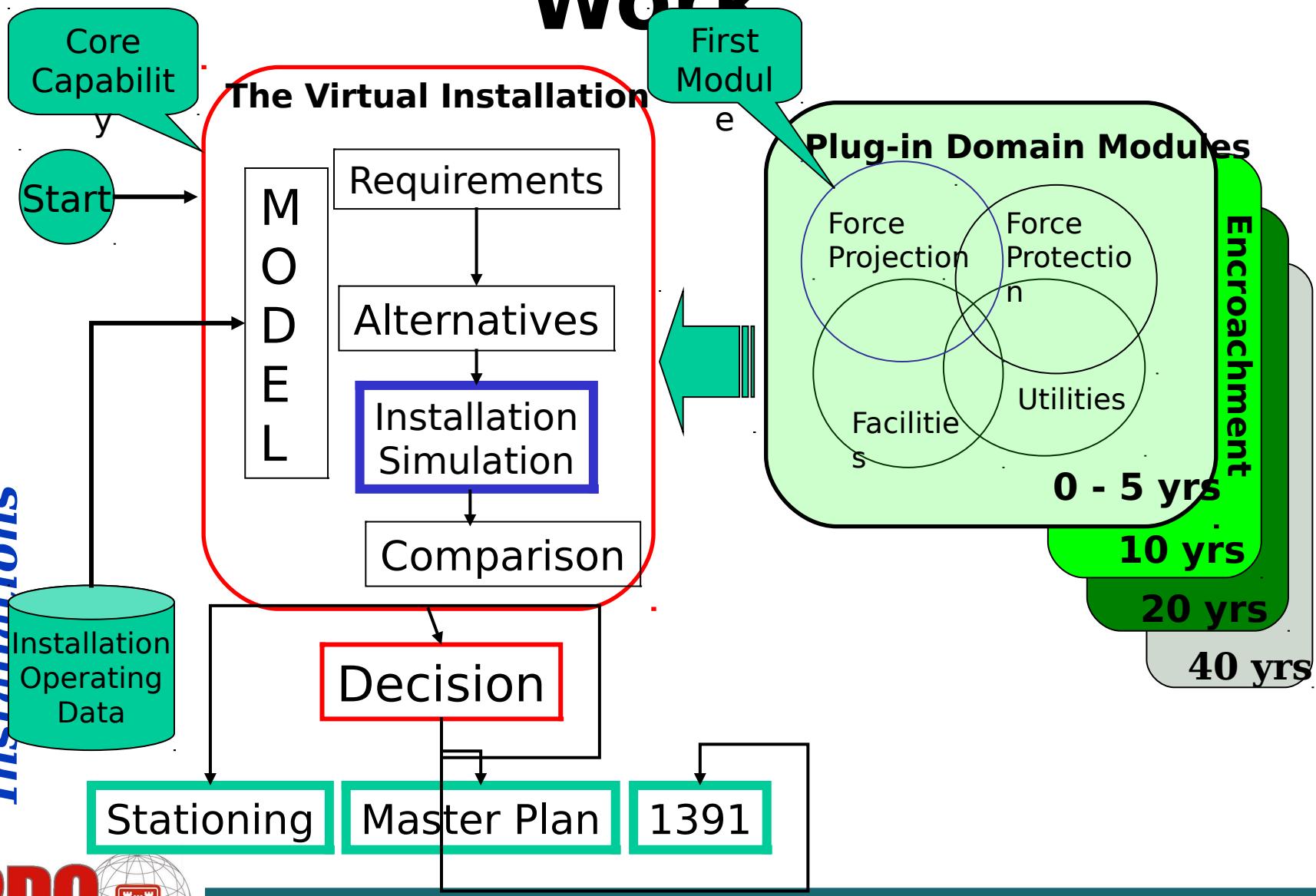
Components

*Environmental Quality and
Installations*



How Fort Future Tools Will Work

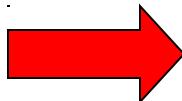
*Environmental Quality and
Installations*



"One ERDC....Providing Technologies for the Transformed Army"

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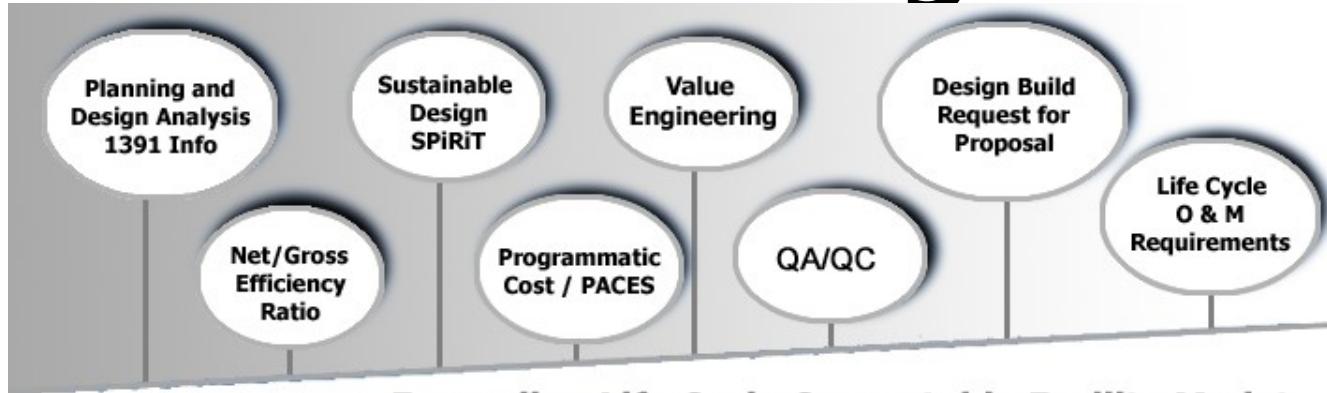


Facility Planning Tools

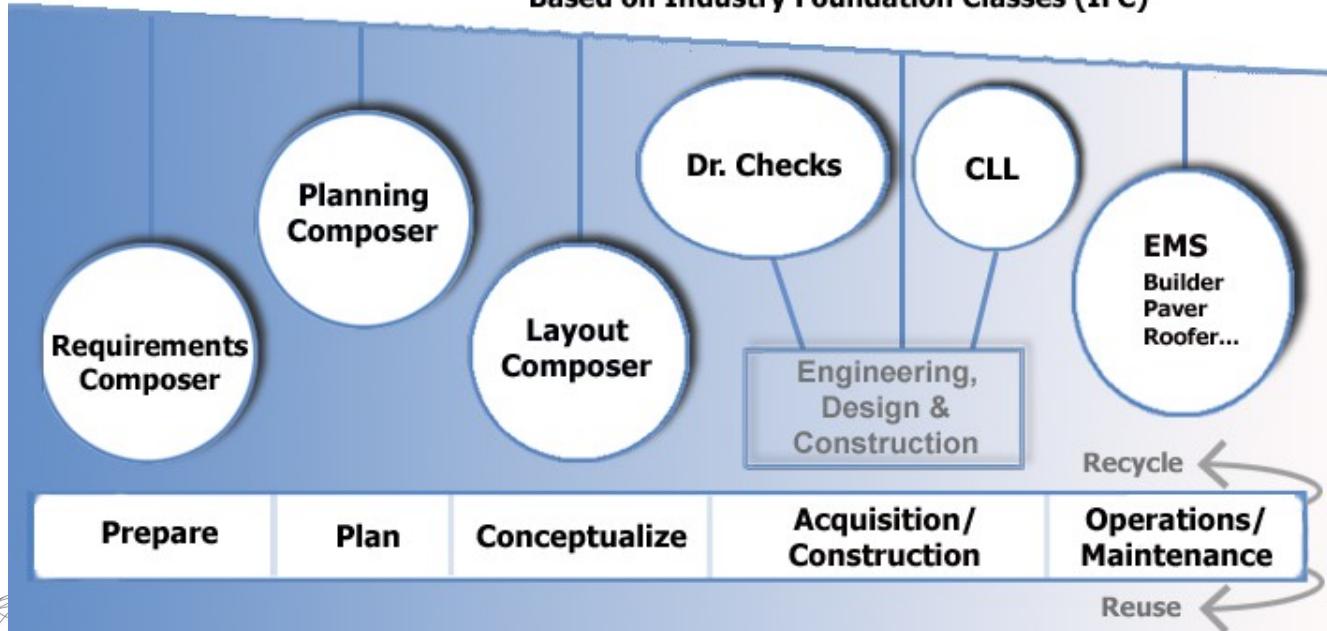


"One ERDC....Providing Technologies for the Transformed Army

Life-Cycle Facility Modeling



Expanding Life Cycle Computable Facility Model
Based on Industry Foundation Classes (IFC)



"One ERDC....Providing Technologies for the Transformed Army

Why Facility Composer?

- Capture requirements that are governmental in nature
- Rapidly generate facility requirements and programmatic cost estimate
- Easier to work with contractors
- Better interoperability with technology vendors

What is Facility Composer?

Criteria/Requirements-Based Design

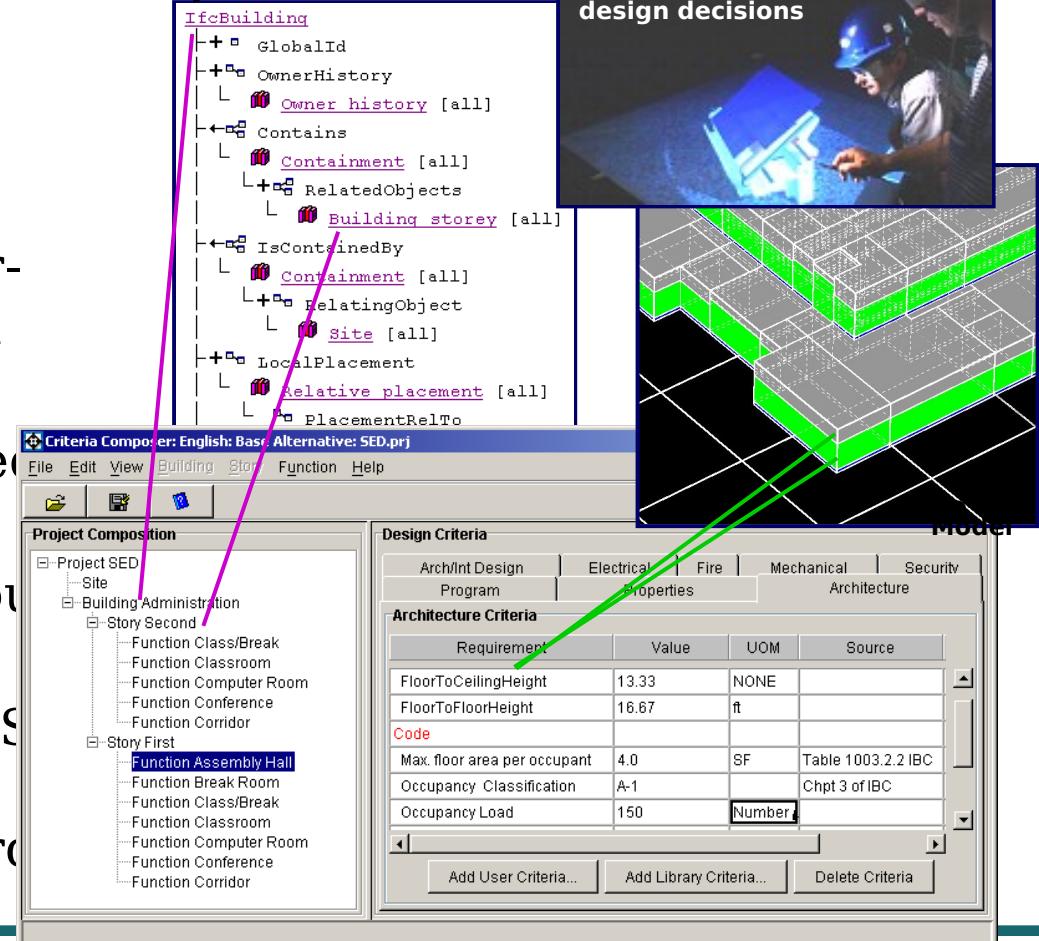
- Create standard requirements and criteria repository
- Generate architectural program and preliminary design based on customer-specific requirements and criteria

Jump start standards-based computable data model

Create 2-D/3-D space layouts with associated criteria

Integrate with COTS/GOTS CAD and analysis tools through modeling standards

Modeling Standards (IAI) Industry Foundation Class (IFC)

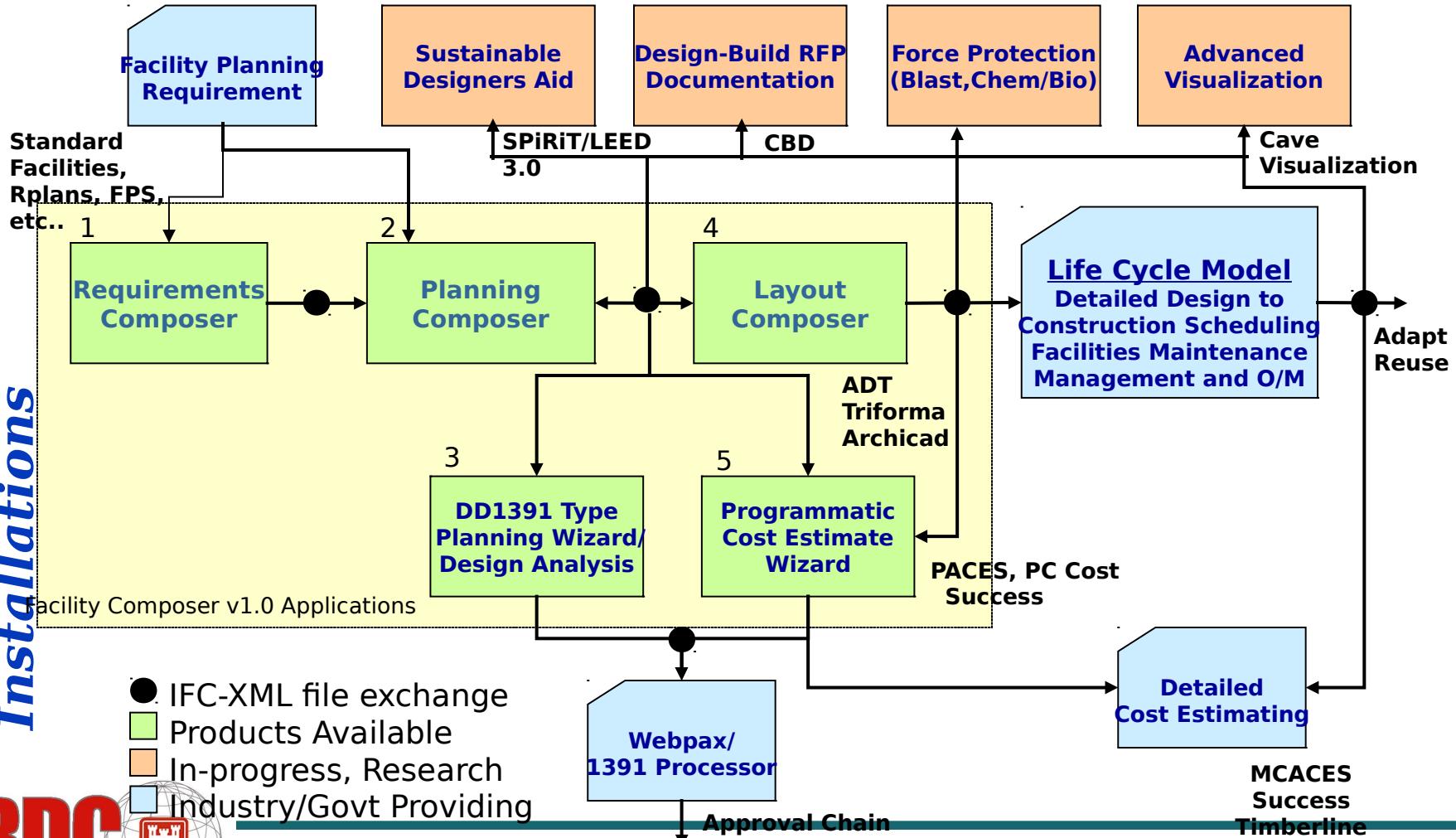


Advanced
Visualization for
making OF facility
design decisions

Facility Modeling Process

for Planning Charrettes to Design-Build Documentation

Environmental Quality and
Installations



- IFC-XML file exchange
- Products Available
- In-progress, Research
- Industry/Govt Providing

"One ERDC....Providing Technologies for the Transformed Army

Requirements Composer

- Centralized repository
- Links requirements to project, building, story, function, or space type
- Outputs XML library for use in developing facility program
- Provides permission based access controls

BCCM: Criteria list - Microsoft Internet Explorer

Criteria Name	Category	Discipline	Last Mod.	Updated By
Accessible Parking	Required Parking	Civil	04/03/03	Matt Geaman
Area Cover - Grass	Grass Area	Landscaping	04/03/03	Matt Geaman
Area Cover - Woodland	Woodland Area	Landscaping	04/03/03	Matt Geaman

FCRC: Libraries - Microsoft Internet Explorer

Library Name	Library Type	Organization	POC
Barracks Facility	Barracks	CERL	Matt Geama
Battle Simulation Facility	Battle Sim	CERL	Matt Geama
CACTF Facility	CACTF	CERL	Matt Geama
Component Library Test	Army Reserve - Layout	CERL	Susan Pres:
Dave McKay x3495	USN Admin Bldg (CC 610-10)	CERL	Dave McKay
Digital Multiuse Range	Range Facility	CERL	Matt Geama

"One ERDC....Providing Technologies for the Transformed Army

Planning Composer

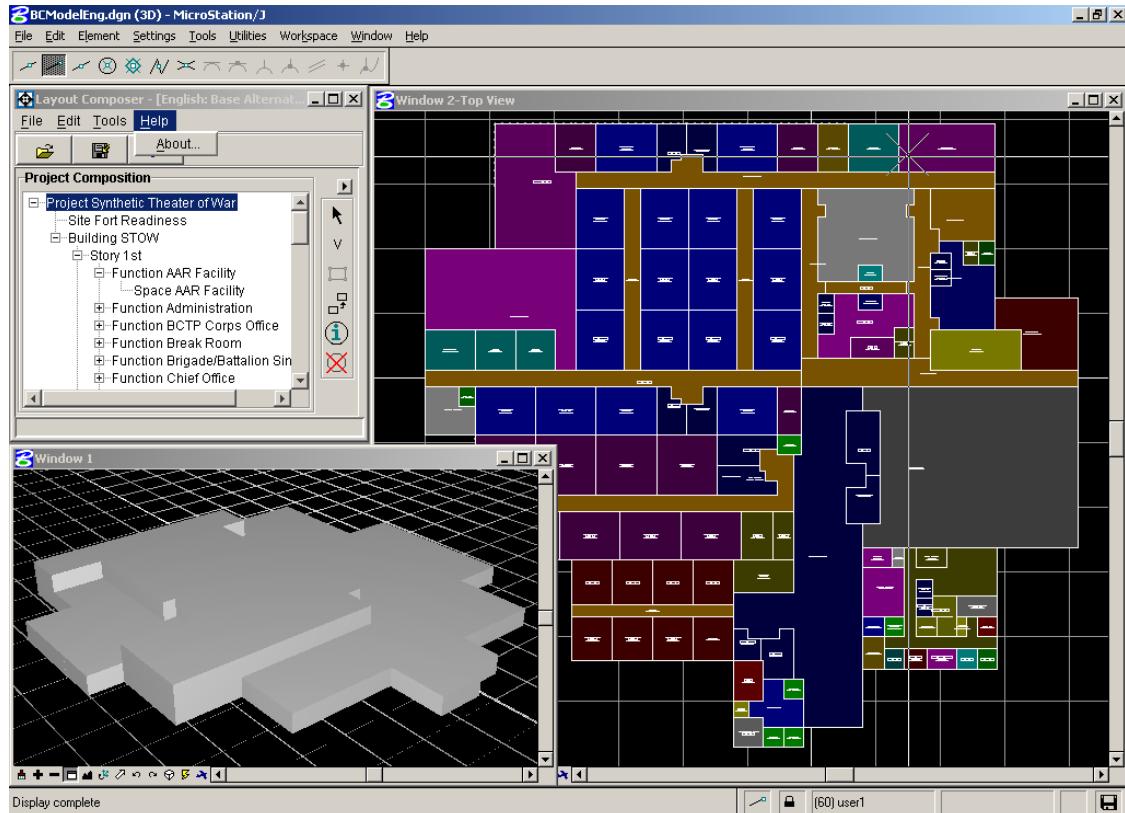
- Create facility program with associated project criteria and requirements
- Creates IFC model from chosen requirements
- Repository/startin g place for GOTS and COTS analysis tools

The screenshot displays the Planning Composer application window. On the left, the 'Project Composition' pane shows a hierarchical tree structure of a project named 'Project Synthetic Theater of War'. Under this root node are 'Site Fort Readiness' and 'Building STOW'. 'Building STOW' has two children: 'Story One' and 'Story Two'. 'Story One' contains nodes like 'Function Chief Office', 'Function Closet', and 'Function Communications Room'. 'Story Two' contains nodes like 'Function Brigade/Battalion Simulation', 'Function Communications Room', and 'Function Director Office'. In the center, the 'Project Requirements' pane is open, showing tabs for Mechanical, Security, Fire, Electrical, Landscaping, Zoning, and Reporting. The 'Civil' tab is selected, displaying sections for 'Civil Requirements' and 'Soil'. The 'Civil Requirements' section includes fields for 'Requirement', 'Value', 'UOM', and 'Source'. The 'Soil' section lists 'Soil Type' as 'Clay'. On the right, a detailed 'Design Analysis' dialog box is open, containing a large amount of descriptive text about the site planning process and design objectives. At the bottom right of the dialog are 'OK' and 'Cancel' buttons.

Layout Composer

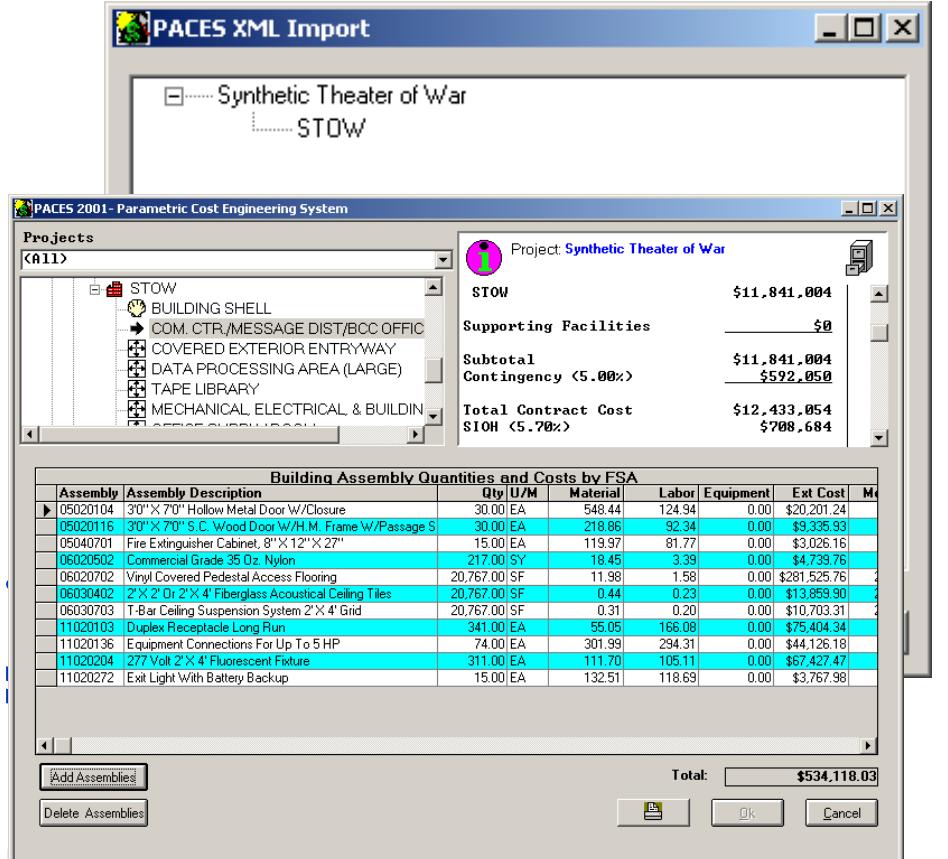
Environmental Quality and Installations

- Generates facility representations in 2D and 3D
- Generates IFC model that meets facility criteria and requirements
- Tracks design solutions against criteria and requirements
- Supports multiple view representations for design analysis (color by function, mass modeling, bubble diagramming)



PACES

Parametric/Programmatic Cost Analysis



- Provide parametric programmatic cost estimate based on user requirements and/or schematic layout
- Rapidly determine cost trade-offs of design choices:
 - ✓ Time/Location
 - ✓ Higher sustainability rating
 - ✓ More secure

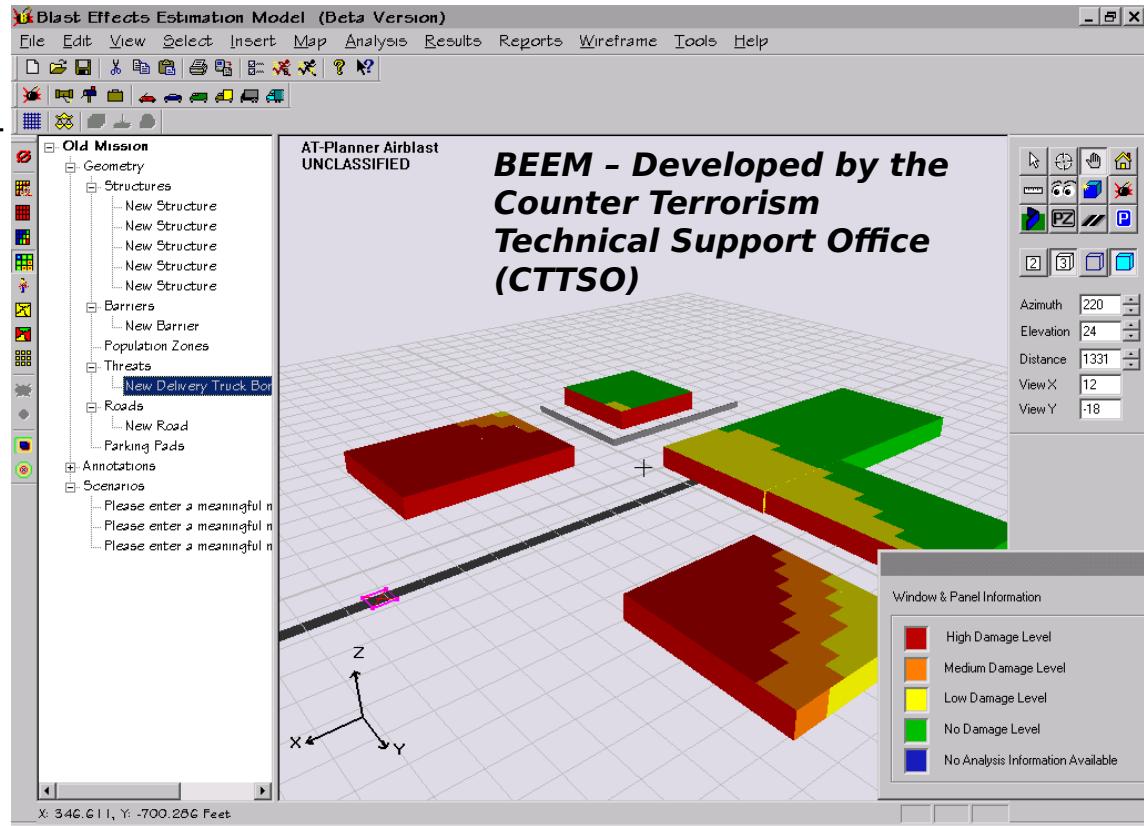
PACES, EarthTech, Inc.

Force Protection Analysis

Blast Effects Estimation Model (BEEM)

- Export geometry and building data from Facility Composer to BEEM

Evaluate performance of building during various threats and countermeasures



Sustainability Analysis

Sustainable Designer's Aid

- Link to Sustainable Project Rating Tool(SPiRiT)
- Provide process for using SPiRiT
- Record and track rationale
- Generates SPiRiT rating
- Reuse previous strategies for subsequent projects

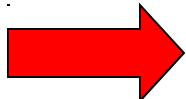
The screenshot displays the "Sustainable Designer's Aid - Step 2 of 3" application window. On the left, a navigation tree under "FEASIBILITY" shows sections like 1.0 Sustainable Sites, 2.0 Water Erosion Control, 3.0 Energy, etc. The main area features a "Feasibility Table" with columns for NUM., DESCRIPTION, INTENT, AVAIL PTS, TARGET, and COMM. A row for "1.0 Sustainable Sites" is selected, showing intent "1.R1 Erosion; Sedimentation and Water Control" and availability "20". Below the table, two web browser windows are open: one for "Army Sustainable Design & Development" and another for "ERDC - CERL's Sustainable Design And Development Resource". Both sites feature green building icons and sustainability-related content.

www.cecer.army.mil/sustdesign/SPiRiT.cfm

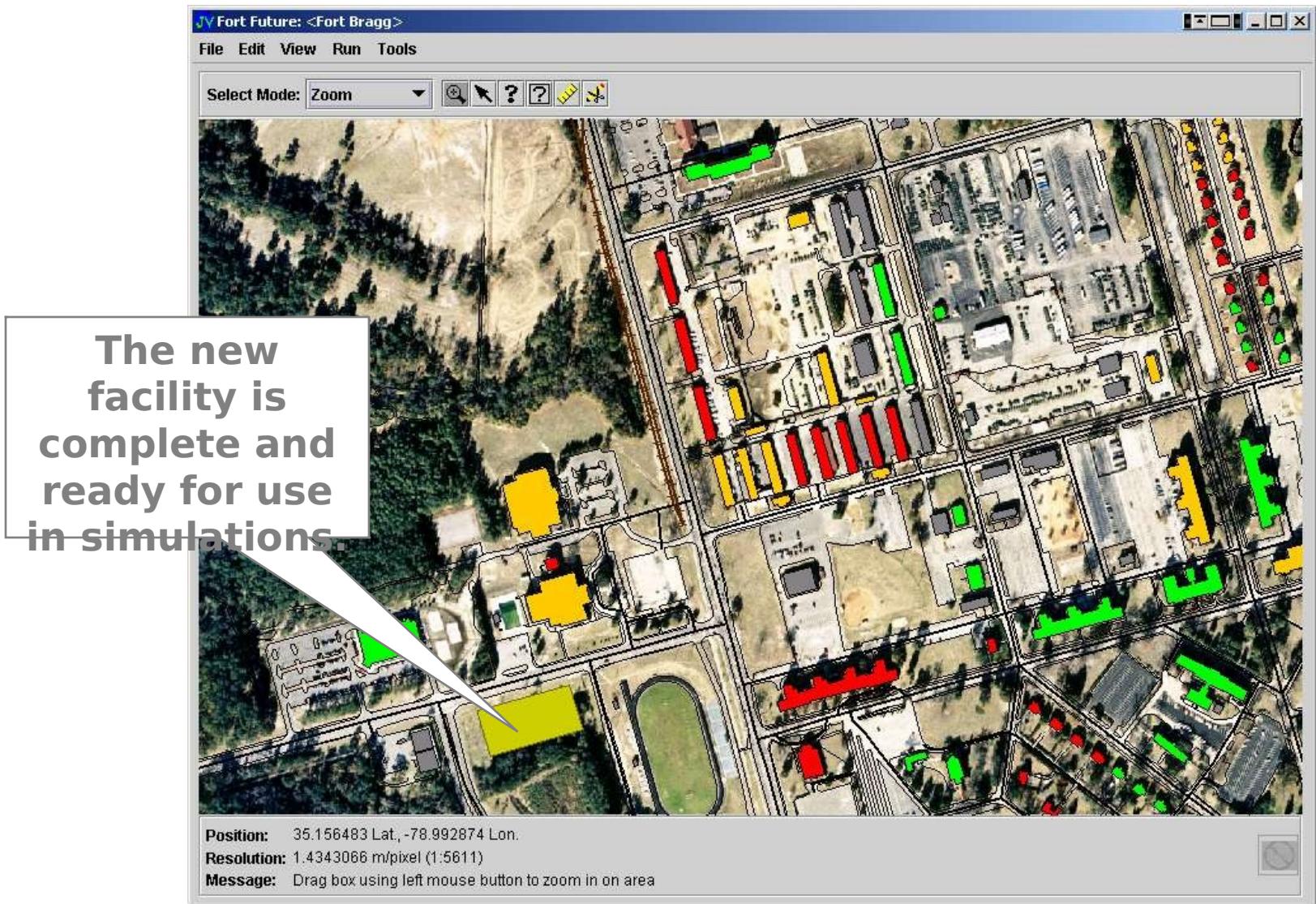
"One ERDC....Providing Technologies for the Transformed Army"

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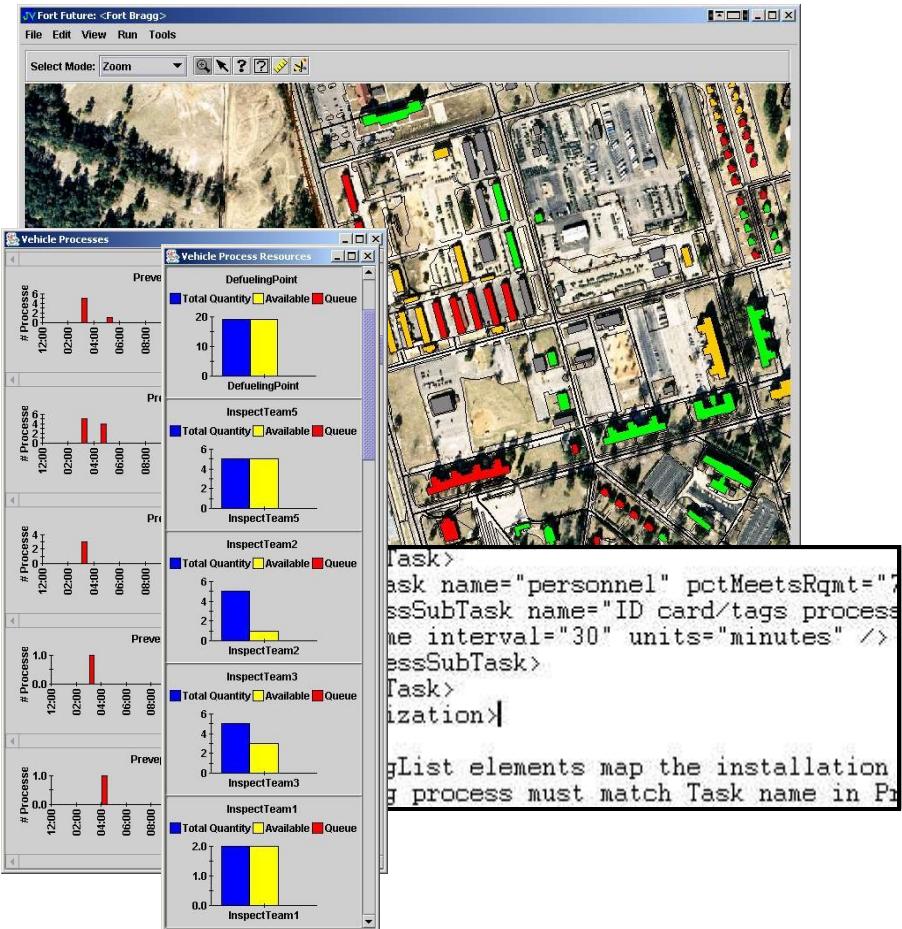
Virtual Installation



Force Projection

Force Projection Simulation

- Charts
 - Resource utilization
 - Process completion
- Text output of simulation - what the agents in the simulation are doing
- Facility status monitor



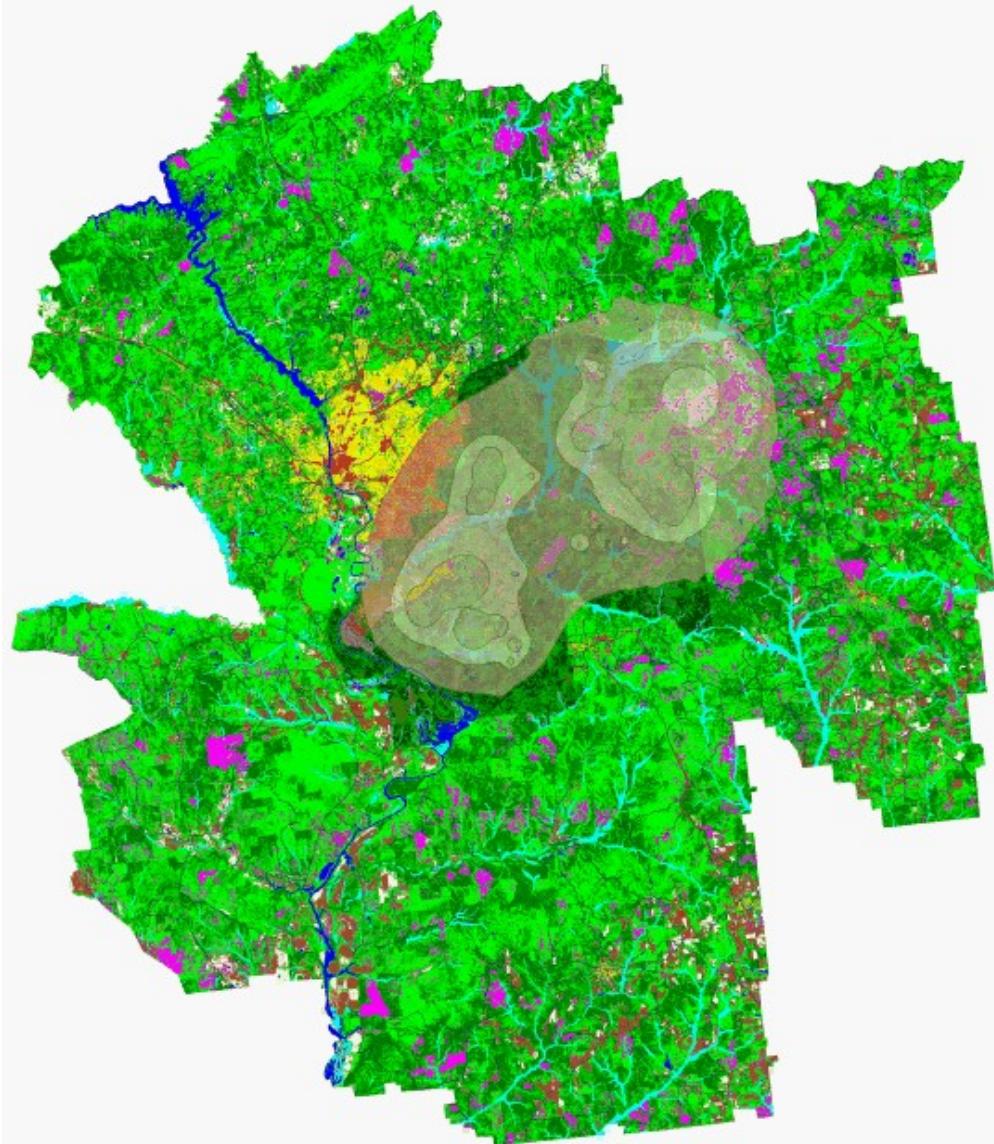
Future Land
Change
Projections

Potential Conflicts: Noise Generation and Urban Growth

current/planned
training

- Noise vs
Community Growth

1993-2050



Sustainable Installation Regional Resource Assessment

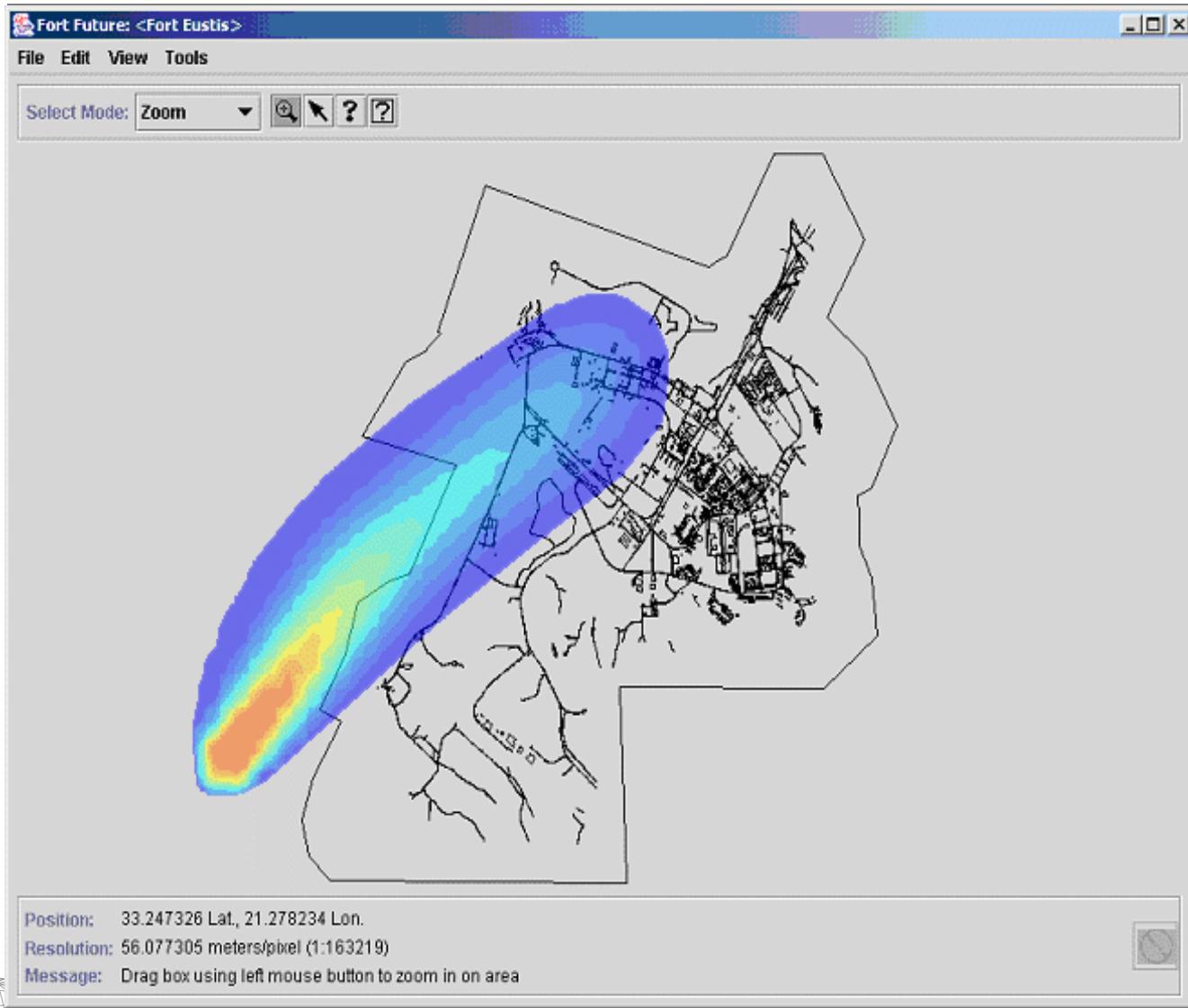
- Sustainability Indicators
- Auditable Data Sources
- 300 DOD Installations

Selected service branch: Army (132 installations)

Installation by State		Indicators							
Installation	State	Air Sustainability		Energy Sustainability					
		Criteria Pollutant Non-Attainment (num. violations)	Noise Complaints (num. complaints)	Electrical Source (% non-coal fossil-fueled)	NAG Price Variability (% of US avg. NAG price)	Petroleum Price Variability (% of US avg. petroleum product price)	NAG Imports (% Dependance)	Petroleum Imports (% Dependance)	Electrical Price Structure
Anniston AD (Army)	Alabama	0	0	0.04	-0.18	0.2	-0.59	54.94	No Regulation
Fort McClellan (Army)	Alabama	0	-	0.04	-0.18	0.2	-0.59	54.94	No Regulation
Fort Rucker (Army)	Alabama	0	0	0.04	-0.18	0.2	-0.59	54.94	No Regulation
Phosphate Development Works (Army)	Alabama	0	-	0.04	-0.18	0.2	-0.59	54.94	No Regulation
Redstone Arsenal (Army)	Alabama	0	3	0.04	-0.18	0.2	-0.59	54.94	No Regulation
Fort Greely (Army)	Alaska	0	0	0.75	0.47	-0.13	-0.15	27.46	No Regulation
Fort Jonathan Wainwright	Alaska	0	0	0.75	0.47	-0.13	-0.15	27.46	No Regulation

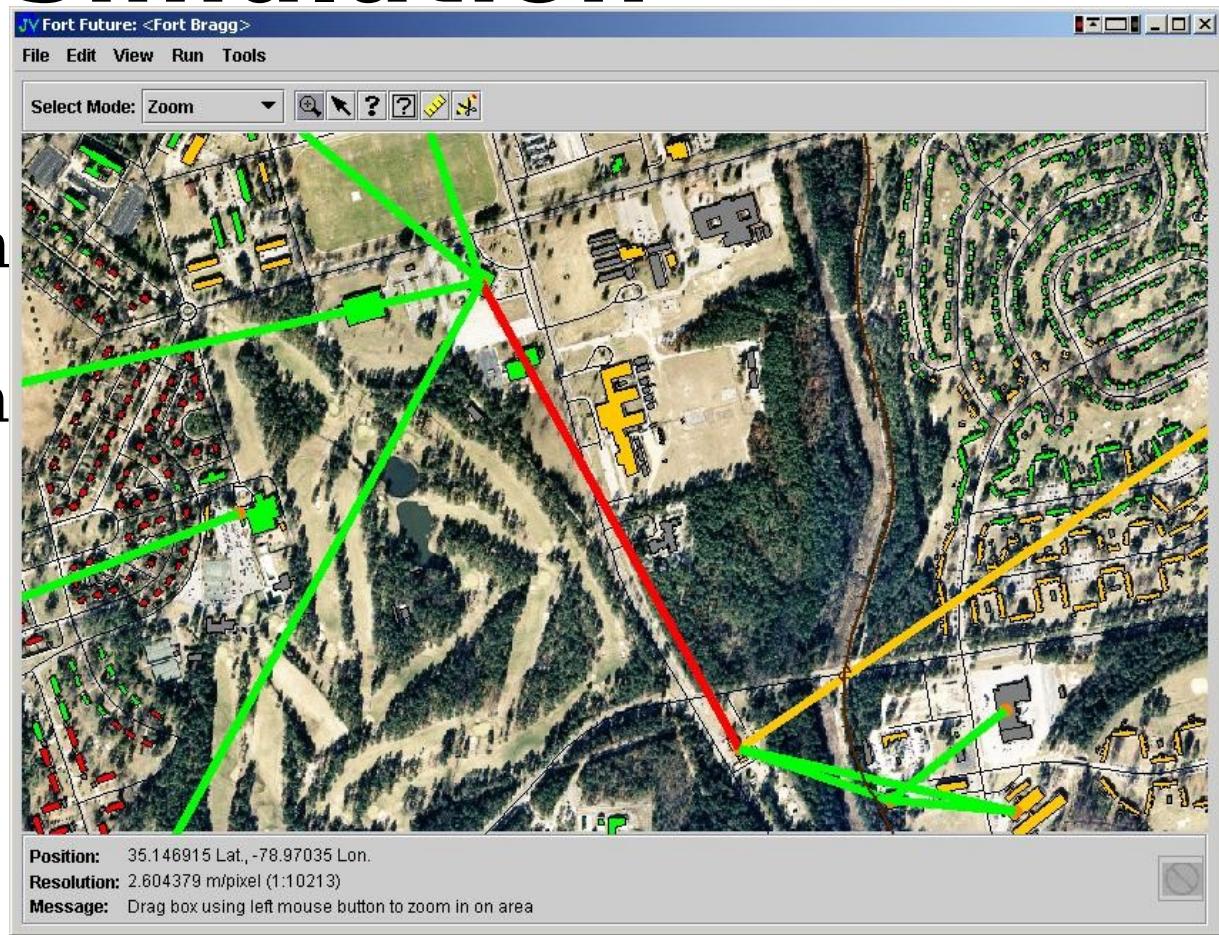
Environmental Quality and Installations

CBRN



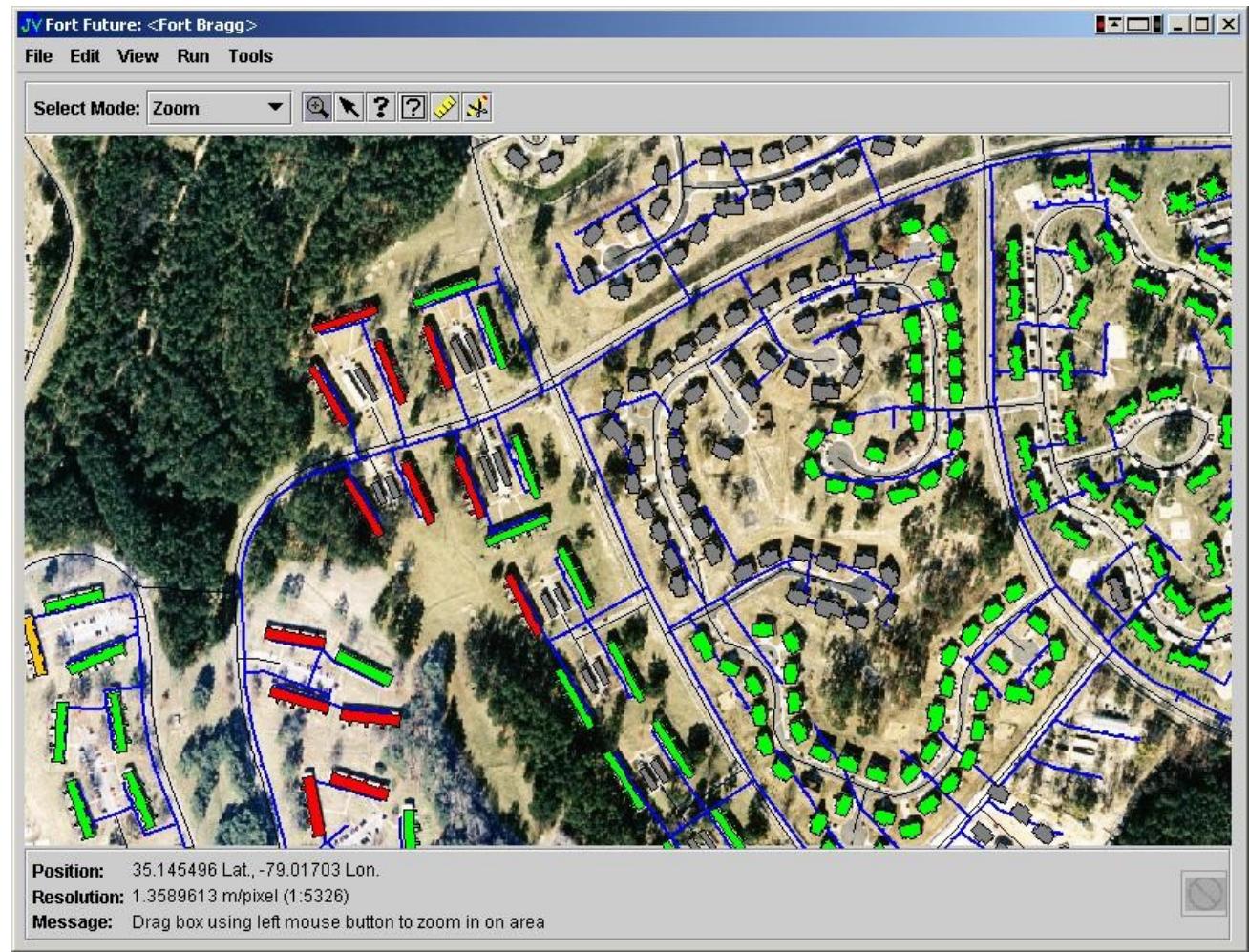
Electrical Power Simulation

- Capacity
- Vulnerability
- Interacts with other simulations in Virtual Environment



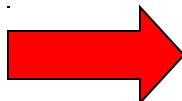
Water System Simulation

- Capacity
- Vulnerable to interruption
- Contamination
- Fuel system to follow in FY05



Outline

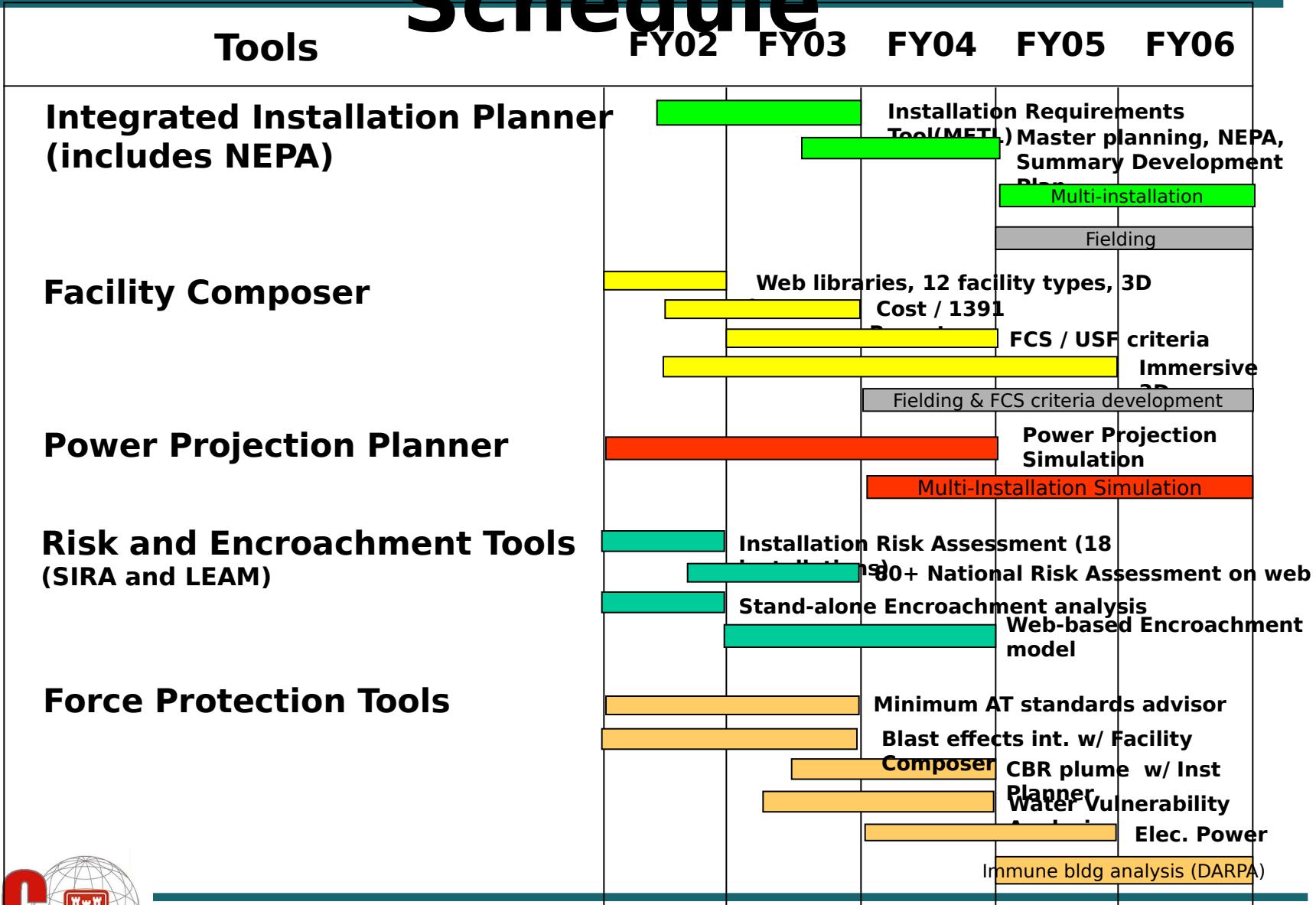
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Fort Future Tools

Schedule

*Environmental Quality and
Installations*



Home Page

[Site Map](#)

Fort Future Home - Microsoft Internet Explorer

User: Not Logged in.

Topics

[Home](#)
[Resources](#)

Welcome

Fort Future Development Site

Welcome to the Fort Future development server. This site will become operational on October 4, 2004. Until then, users of this site should be aware that applications are made available here only for testing and comment. If you have questions about the Fort Future Program, please contact the Fort Future Special Project Officer, Dr. Michael Case, at (217) 373-7259 or by electronic mail at michael.case@erdc.usace.army.mil.

About Fort Future

Simulation and Modeling for Installation Transformation

Fort Future is a research program designed to produce capabilities critical to the Army's ability to transform its installations in the tight timeframe required to support our emerging forces. Much as field commanders gain a superior advantage by visualizing the battle space, installation planners will be able to make strategic decisions by visualizing results of many different scenarios.

Technical Notes

Read more about Fort Future

- [Integrated Installation Planning: Technology for Sustainable Installations](#)
- [mLEAM: The Military Land use Evolution And impact Model](#)
- [Building a Computable Facility Model](#)
- [Dynamic Modeling and Simulation Tools for Utility Systems](#)
- [Modeling and Simulation for Force Protection](#)

For problems or suggestions, please contact the [webmaster](#) (webmaster@bc.cecer.army.mil)
Problems with apps? See the [support](#) page.
Visit the [downloads](#) page for Fort Future software & tutorials.

[[Privacy Policy](#)] [[Why Register?](#)] [[Register](#)]

Local intranet

 FORT FUTURE

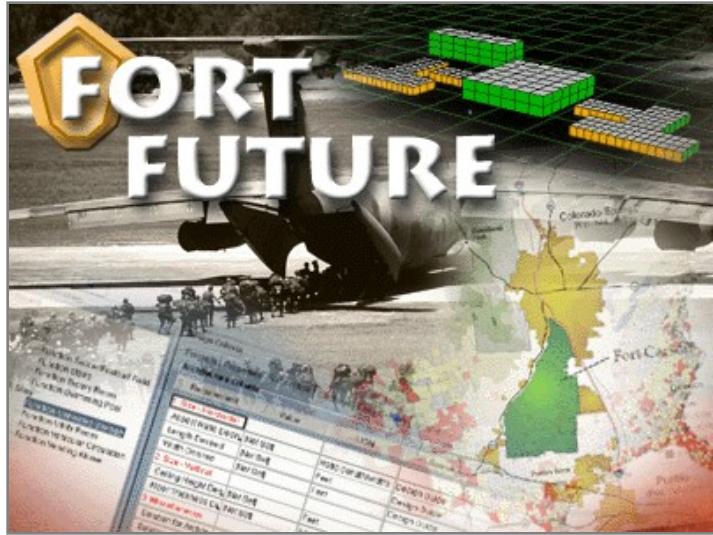


 Engineer Research and Development Center
US Army Corps of Engineers®

For More Information

Fort Future Site: <http://ff.cecer.army.mil>

Facility Composer Site: <http://bc.cecer.army.mil>



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